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DILWORTH & BARRESE, LLP
333 EARLE OVINGTON BLVD.
UNIONDALE, NY 11553

EXAMINER	
DUONG, THANH P	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/973,401	KARRS ET AL.	
	Examiner	Art Unit	
	Tom P. Duong	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38 and 50-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38 and 50-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

In view of the appeal brief filed on 01/26/06, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-3, 8, 14, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by European Patent Application 0166480 (EU '480). It is noted that the

system is being examined as an apparatus. Regarding claims 1 and 8, EU '480 discloses a system for catalytically treating a gas stream (Figure and page 1), which comprises: a gas phase reactor containing a catalyst (disks 20) for the treatment of the gas stream containing NOx (page 2, line 1) in at least one catalyst bed having an upstream end and a downstream end; an axial fan (7) positioned upstream of the at least one catalyst bed and having a rotatable impeller (rotor blades as shown in Figure) for moving the gas stream through the gas phase reactor; and, c) gas flow modification means (the flare portion 34 connected after the constricted area 13 as shown in Figure) positioned between the impeller and the gas phase reactor for decreasing gas stream velocity, and increasing gas flow uniformity. Regarding claims 2 and 3, the flow gas modification means of EU '480 inherently provides a gas stream entering the gas phase reactor with a velocity profile exhibiting not more than about 10% or 5% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst bed being the fact that EU '480 discloses all structural limitations of the claimed invention. Note, "apparatus claims cover what a device is, not what a device does." See *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). See MPEP 2114. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. See *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Regarding claims 14 and 15, EU '480 discloses the fan (7) impeller includes a plurality of blades as shown in Figure 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 21-23, 31, 34-35, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi (5,282,355). Regarding claims 1, 21-23, and 31, Yamaguchi discloses a system for catalytically treating a furnace flue gas (Fig. 2), which comprises: a) gas phase reactor containing a catalyst (6) for the treatment of the flue gas in at least one catalyst bed (Col. 1, lines 50-55) having an upstream end and a downstream end for removal of NOx; b) an axial fan (gas turbine 1) positioned upstream of the at least one catalyst bed and downstream of furnace and having a rotatable impeller (inherent feature of a gas turbine) for moving the flue gas from the furnace through the gas phase reactor; and, means for recycling a portion of the flue gas (via component 10) from downstream of the axial fan to a convection section (section 4). Note, the convection section 4 has a front conical transition duct which constitutes the gas flow modification means for decreasing the gas velocity. With respect to the recycling portion of the flue gas to the convection section of the furnace located upstream of the axial fan, it would have been obvious in view of Yamaguchi to one

having ordinary skill in the art to recycle a portion of the flue gas upstream of the gas turbine to effectively pressurized and deliver the gas back into the catalytic system for gas treatment and such configuration provides a cost savings by eliminating the need for additional exhaust fan. It is submitted whether recycling a portion of the flue gas downstream of the axial fan to either upstream or downstream of the axial fan does not alter the mechanism of purifying the flue gas stream being the fact that the flue gas stream is mixed and vaporized the reducing agent NOx upstream of the catalyst member (6) [the flue gas stream (via fan 10) is mixed and vaporized the reducing agent (via line 8) prior to reaction taking place in the catalyst member 6 of Yamaguchi '355] as evidenced by Yamaguchi '355. Furthermore, the recitation with respect to recycling a portion of the flue gas upstream of the axial fan is directed to the manner of operating a device which does not differentiate the claimed apparatus from a prior art. See Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Regarding claims 22 and 23, Yamaguchi shows the exhaust gas and the reducing agent (ammonia) are feed to the recycle manifold (plurality of spray nozzles connected to a common pipe as shown in Fig. 2 in the convection section). Regarding claims 34 and 35, Yamaguchi discloses a gas turbine, which inherently has blade units comprise of blades extending radially outward from the impeller. Regarding claim 38, Yamaguchi discloses a heat recovery section (5) downstream of the phase reactor.

3. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480. EU '480 shows convergent section 13 with enlarged section 34, which decreases

the gas stream velocity and increasing the gas flow uniformity at most thru routine optimization. It appears EU '480 provide a gas flow modification means with the gas stream entering the gas phase reactor has a velocity profile exhibiting not more than about 10% or 5% velocity deviation from an average gas stream velocity at the upstream end of the at least one catalyst bed. Note, apparatus claims cover what a device is, not what a device does. See MPEP 2114.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of Surette (5,632,142). Regarding claim 4, EU '480 discloses the axial fan (7) includes a housing (casing 30-31) and a flared portion (convergent section 13 to wall 34) but fails to disclose a tail cone includes a distally pointing tapered end portion. Surette teaches a gas turbine engine 101 with a tail cone (nozzle plug 117) to minimize turbulence and provide a smooth and uniform flow path to the diffuser 115 or downstream duct (Col. 3, lines 21-23 and Col. 3, lines 38-44). Thus, it would have been obvious in view of Surette to one having ordinary skill in the art to modify the turbine structure of EU '480 with a gas turbine with a tail cone as taught by Surette in order to provide a smooth flow stream downstream of the turbine blades or axial fan blades. Note, Surette also makes it clear the function of the flared portion (diffuser 34) is to reduce the velocity of the exhaust gas (Col. 4, lines 58-67).

5. Claims 5, 50, 51, and 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (EU '480 in view of Surette '142) as applied to

claims 1 and 4 above, and further in view of Tyler et al. (2,936,846) and Ishikawa et al. (5,043,146). The applied references disclose a transition duct (convergent section 13 to wall 34 of EU '480 and bell-shaped wall 119 of Surette '142) which flare outward so as to gradually increase cross-sectional area available to gas stream flow and the circumference of the housing gradually increases from a position of the housing at the axial fan to the outlet of the housing but fail to disclose the transition duct having perforated walls. Tyler '846 teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler '846 to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler '846 in order to reduce the noise generated from the exhaust gas. Alternatively, Ishikawa teaches a flow controller 3 or guide vane unit (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer (Col. 5, lines 14-17) and to provide a uniform exhaust gas flow to the catalyst layer (Col. 1, lines 31-38). Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Ishikawa in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer.

6. Claims 6 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of Tyler et al. '846 and Ishikawa et al. '146. EU '480 discloses a

transition duct (convergent section 13 to wall 34 of EU '480) which flare outward so as to gradually increase cross-sectional area available to gas stream flow but fails to disclose the transition duct having perforated walls. Tyler '846 discloses a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler '846 to one having ordinary skill in the art to modify the transition duct of EU '480 having perforated walls as taught by Tyler '846 in order to reduce the noise generated from the exhaust gas. Alternatively, Ishikawa teaches a flow controller 3 (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer (Col. 5, lines 14-17) and to provide a uniform exhaust gas flow to the catalyst layer (Col. 1, lines 31-38). Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of EU '480 having perforated walls as taught by Ishikawa in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer.

7. Claims 7 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of Yamaguchi (5,282,355). Regarding claim 7, EU '480 fails to disclose means for recycling a portion of the gas stream from downstream of the axial fan to a position upstream of the axial fan. Yamaguchi '355 teaches a portion of the NOx –free exhaust gas stream is recirculated back to the a position upstream of the

axial fan (best understood by Examiner to be the front back of the catalyst system) to facilitate vaporizing the aqueous ammonia prior to injecting to the catalyst layer of the NOx removal system 6 (Col. 1, lines 31-46). Thus, it would have been obvious in view of Yamaguchi '355 to one having ordinary skill in the art to modify the exhaust treatment system of EU '480 with a recycling exhaust stream as taught by Yamaguchi in order to facilitate vaporizing of the aqueous ammonia to be used in the catalyst system. Regarding claim 18, EU '480 fails to disclose a heat recovery section positioned downstream of the gas phase reactor for cooling the gas stream. Yamaguchi teaches a heat exchanger 5 located both upstream and downstream of the exhaust gas to recover the heat from the exhaust gas to be used in a boiler (Col. 1, lines 21-31). Thus, it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to modify the exhaust treatment system of EU '480 with a heat recovery section as taught by Yamaguchi in order to recover the heat from exhaust gas. Regarding claim 19, EU '480 fails to disclose means for introducing reducing agent into the gas stream. Yamaguchi teaches a reducing agent (ammonia) is introduced by via nozzle 10a (Fig. 3) to facilitate in reducing the NOx in the exhaust gas (Col. 1, lines 50-55). Thus, it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to modify the exhaust treatment system of EU '480 with means for introducing reducing agent in to the gas stream as taught by Yamaguchi in order to facilitate the conversion of NOx to nitrogen. Regarding claim 20, EU '480 fails to disclose a gas stream recycle manifold [spray nozzles connected to common pipe (via line 10)] for communicating a portion of the gas stream downstream of the axial fan to a convection section of a furnace

positioned upstream of the axial fan, wherein the means for introducing reducing agent comprises an inlet for introducing the reducing agent into the gas stream recycle manifold. Yamaguchi discloses a gas-recycling stream (via fan 10) downstream of a gas turbine 1 to facilitate vaporizing the ammonia and means for introducing reducing agent (via nozzle 10a) to facilitate in reducing the NOx (Col. 1, lines 50-55). Thus, it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to modify the gas treatment system of EU '480 with a gas recycling stream and means for introducing the reducing agent as taught by Yamaguchi in order to facilitate vaporizing the ammonia and reducing the NOx.

8. Claims 9-10 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of Balling et al. (5,397,545). EU '480 discloses the catalyst elements 20 but fails to disclose the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite. Balling '545 teaches a plurality of stacked honeycomb catalytic converters (8,10,12,14,16) (Col. 4, lines 65-68) made of vanadium pentoxide, molybdenum oxide, and etc. (Col. 5, lines 1-6) to facilitate the conversion of nitrogen oxide to nitrogen and carbon dioxide (Col. 6, lines 18-24). Thus, it would have been obvious in view of Balling to one having ordinary skill in the art to modify the catalyst elements of EU '480 with a honeycomb catalyst converters as taught by Balling to facilitate the conversion of NOx to nitrogen.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of Carlborg et al. (6,534,022). EU '480 discloses catalyst elements 20 but fails to disclose the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%. Carlborg teaches the catalyst is supported on a mesh-like structure with a porosity greater than 85% (Col. 2, lines 1-7), which provides the benefits of superior heat transfer, low thermal mass, and improved catalyst effectiveness (Col. 8, lines 35-39). Thus, it would have been obvious in view of Carlborg to one having ordinary skill in the art to modify the catalyst elements of EU '480 with a catalyst of a mesh-like structure as taught by Carlborg in order to gain the above benefits.

10. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of prior art Admission and. EU '480 discloses fan blades but fails to disclose blade units have a variable pitch. Admission discloses it is conventional to use blade units with variable pitch to control the flue gas velocity (specification page 9, lines 15-23). Thus, it would have been obvious in view of Admission to one having ordinary skill in the art to modify the fan blade of EU '480 with the blades having variable pitch in order to control the flue gas velocity.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of Acaster (5,709,088). EU '480 shows a fan having impeller but fails to disclose

the impeller has a variable speed of rotation which is adjustable while the impeller is rotating. Acaster teaches an engine turbine (Fig. 1) having an impeller with variable speed of rotation depending on the demand of the exhaust gas quantity and pressure. Thus, it would have been obvious in view of Acaster to one having ordinary skill in the art to modify the fan of EU '480 with impeller has a variable speed of rotation as taught by Acaster in order to keep up with the demand of the exhaust gas and pressure. Note, it is conventional to provide impeller with gear reduction or variable drive ratio and it would have been obvious to do so here control the exhaust gas flow rate.

12. Claims 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over EU '480 in view of Yamaguchi (5,282,355). Regarding claims 21-23, EU '480 discloses a system for catalytically treating a gas stream (Fig. 1 and page 1), which comprises: a gas phase reactor containing a catalyst (disks 20) for the treatment of the gas stream containing NOx (page 2, line 1) in at least one catalyst bed having an upstream end and a downstream end; an axial fan (7) positioned upstream of the at least one catalyst bed and having a rotatable impeller (rotor blades as shown in Fig. 1) for moving the gas stream through the gas phase reactor. EU '480 discloses the claimed invention except fails to disclose means for recycling a portion of the gas stream from downstream of the axial fan to a position upstream of the axial fan and means for introducing the reducing agent into the recycle manifold. Yamaguchi discloses a gas-recycling stream (via fan 10, Figure 2) downstream of a gas turbine 1 to facilitate vaporizing the ammonia and means for introducing reducing agent (via nozzle 10a) to the convection (4) facilitate in

reducing the NOx (Col. 1, lines 50-55). The recitation of " recycling a portion of the flue gas stream downstream of the axial fan to the upstream of the axial fan is directed to the manner of operating a device, intended use, and rearrangement of parts. See In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963) and See *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) and *In re Japiske,* 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). It is submitted whether recycling a portion of the flue gas downstream of the axial fan to either upstream or downstream of the axial fan does not alter the mechanism of purifying the flue gas stream being the fact that the flue gas stream is mixed and vaporized the reducing agent NOx upstream of the catalyst member (6) [the flue gas stream (via fan 10) is mixed and vaporized the reducing agent (via line 8) prior to reaction taking place in the catalyst member 6 of Yamaguchi '355] as evidenced by Yamaguchi '355. Thus, it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to modify the gas treatment system of EU '480 with a gas recycling stream and means for introducing the reducing agent as taught by Yamaguchi in order to facilitate vaporizing the ammonia and reducing the NOx. Regarding claim 24, it is conventional to provide control valve in a recycled gas stream and it would have been obvious to do so here to regulate the amount of gas flow rate recycled back into the convection section.

13. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (EU '480 in view of Yamaguchi '355) as applied to claim 22 above, and further in view of Tyler et al. (2,936,846) and Ishikawa et al. (5,043,146).

The applied references disclose a transition duct (convergent section 13 to wall 34 of EU '480) which flare outward so as to gradually increase cross-sectional area available to gas stream flow but fails to disclose the transition duct having perforated walls. Tyler '846 discloses a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler '846 to one having ordinary skill in the art to modify the transition duct of the applied references with perforated walls as taught by Tyler '846 in order to reduce the noise generated from the exhaust gas. Alternatively, Ishikawa teaches a flow controller 3 (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer (Col. 5, lines 14-17) and to provide a uniform exhaust gas flow to the catalyst layer (Col. 1, lines 31-38). Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of the applied references with perforated walls as taught by Ishikawa in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. Regarding claim 26, Yamaguchi shows on Fig. 2 the gas stream recycle manifold has at least one inlet connected to the transition duct, and at least one outlet connected to the convection section of the furnace.

14. Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi '355 in view of Tyler et al. (2,936,846) and Ishikawa et al. (5,043,146).

Yamaguchi '355 discloses a transition duct (4) which flare outward so as to gradually increase cross-sectional area available to gas stream flow but fails to disclose the transition duct having perforated walls. Tyler '846 teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler '846 to one having ordinary skill in the art to modify the transition duct of Yamaguchi having perforated walls as taught by Tyler '846 in order to reduce the noise generated from the exhaust gas. Alternatively, Ishikawa teaches a flow controller 3 (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer (Col. 5, lines 14-17) and to provide a uniform exhaust gas flow to the catalyst layer (Col. 1, lines 31-38). Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of Yamaguchi having perforated walls as taught by Ishikawa in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer. Regarding claim 26, Yamaguchi shows on Fig. 2 the gas stream recycle manifold has at least one inlet connected to the transition duct, and at least one outlet connected to the convection section of the furnace.

15. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi '355 in view of Surette '142. Yamaguchi disclose a turbine 1 (inherently has an axial fan) and the housing having a flared portion (conical section 4) but fails to show

a tail cone includes a distally pointing tapered end portion. Surette teaches a gas turbine engine 101 with a tail cone (nozzle plug 117) to minimize turbulence and provide a smooth and uniform flow path to the diffuser 115 or downstream duct (Col. 3, lines 21-23 and Col. 3, lines 38-44). Thus, it would have been obvious in view of Surette to one having ordinary skill in the art to modify gas turbine of Yamaguchi '355 with a gas turbine with a tail cone as taught by Surette in order to provide a smooth flow stream downstream of the turbine blades or axial fan blades. Note, Surette also makes it clear the function of the flared portion (diffuser 34) is to reduce the velocity of the exhaust gas (Col. 4, lines 58-67).

16. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi '355 in view of Carlborg et al. (6,534,022). Yamaguchi '355 discloses catalyst elements 20 but fails to disclose the catalyst bed comprises a catalyst supported on a mesh-like structure having a void space of at least about 85%. Carlborg teaches the catalyst is supported on a mesh-like structure with a porosity greater than 85% (Col. 2, lines 1-7), which provides the benefits of superior heat transfer, low thermal mass, and improved catalyst effectiveness (Col. 8, lines 35-39). Thus, it would have been obvious in view of Carlborg to one having ordinary skill in the art to modify the catalyst elements of EU '480 with a catalyst of a mesh-like structure as taught by Carlborg in order to gain the above benefits.

17. Claims 28-29 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Yamaguchi '355 in view of Balling et al. (5,397,545). Yamaguchi '355 the catalyst system 6 but fails to disclose the catalyst bed includes a plurality of stackable, individually separable modules containing one or more materials selected from the group consisting of vanadium oxide, aluminum oxide, titanium oxide, tungsten oxide, molybdenum oxide and zeolite. Balling '545 teaches a plurality of stacked honeycomb catalytic converters (8,10,12,14,16) (Col. 4, lines 65-68) made of vanadium pentoxide, molybdenum oxide, and etc. (Col. 5, lines 1-6) to facilitate the conversion of nitrogen oxide to nitrogen and carbon dioxide (Col. 6, lines 18-24). Thus, it would have been obvious in view of Balling to one having ordinary skill in the art to modify the catalyst system of Yamaguchi '355 with a honeycomb catalyst converters as taught by Balling to facilitate the conversion of NOx to nitrogen.

18. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi '355 in view of prior art Admission. Yamaguchi discloses the gas turbine with fan blades but fails to disclose blade units have a variable pitch. Admission discloses it is conventional to use blade units with variable pitch to control the flue gas velocity (specification page 9, lines 15-23). Thus, it would have been obvious in view of Admission to one having ordinary skill in the art to modify the gas turbine of Yamaguchi '355 with the blades having variable pitch in order to control the flue gas velocity.

19. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi '355 in view of Acaster (5,709,088). Yamaguchi disclose a gas turbine with fan blades fails to disclose the impeller has a variable speed of rotation which is adjustable while the impeller is rotating. Acaster teaches an engine turbine (Fig. 1) having an impeller with variable speed of rotation depending on the demand of the exhaust gas quantity and pressure. Thus, it would have been obvious in view of Acaster to one having ordinary skill in the art to modify the gas turbine of Yamaguchi '355 with impeller has a variable speed of rotation as taught by Acaster in order to keep up with the demand of the exhaust gas and pressure. Note, it is conventional to provide impeller with gear reduction having variable drive ratio and it would have been obvious to do so here control the exhaust gas flow rate.

20. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (EU '480 in view of Surette '142 and Tyler et al. '846 and Ishikawa et al. '146) as applied to claims 1 and 4 above, and further in view of Zagoroff et al. (5,476,378). The applied references above fail to disclose the struts positioned in an annular space between the tail cone and the interior surface of the housing. Zagoroff teaches it is conventional to provide a shaft support struts 39 (Fig. 4) to facilitate distributing the air to the turbine blades. Thus, it would have been obvious in view of the applied references to provide struts between the tail cone and the housing to facilitate distributing the air to the system.

21. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (EU '480 in view of Surette '142) as applied to claim 27 above, and further in view of Tyler et al. (2,936,846) and Ishikawa et al. (5,043,146). The applied references disclose a transition duct (convergent section 13 to wall 34 of EU '480 and bell-shaped wall 119 of Surette '142) which flare outward so as to gradually increase cross-sectional area available to gas stream flow and the circumference of the housing gradually increases from a position of the housing at the axial fan to the outlet of the housing but fail to disclose the transition duct having perforated walls. Tyler '846 teaches a turbine engine (Col. 4, lines 25-30) with a transition duct having perforated walls (perforations 48 in walls of cylindrical section 36) to suppress the noise generated by the turbine engine. Thus, it would have been obvious in view of Tyler '846 to one having ordinary skill in the art to modify the transition duct of the applied references having perforated walls as taught by Tyler '846 in order to reduce the noise generated from the exhaust gas. The applied references fail to disclose a guide vane unit disposed at the inlet of the transition duct. Ishikawa teaches a flow controller 3 (rectifier) or guide vane (Col. 3, lines 30-32) is provided in front of the catalyst layer 4 in the duct portion 1 as shown in Figs. 4-5 and 10-11 to prevent the generation of vortexes in front of the catalyst layer (Col. 5, lines 14-17) and to provide a uniform exhaust gas flow to the catalyst layer (Col. 1, lines 31-38). Thus, it would have been obvious in view of Ishikawa to one having ordinary skill in the art to modify the transition duct of the applied references with guide vane unit as taught by Ishikawa in order to minimize the generation of the vortexes and provide a uniform exhaust gas flow to the catalyst layer.

Response to Argument

Applicants' arguments filed in the appeal brief on January 26, 2006 have been fully considered but they are not persuasive.

(1) Applicants argued (on page 13) "EU '480 fails to discloses the features of paragraphs (b) and (c) of Claim 1. Paragraph (b) of Claim 1 recites "an axial fan positioned upstream of the at least one catalyst bed and having a rotatable impeller for moving the gas stream through the gas phase reactor" (emphasis added). The fan system 100 includes a drive motor 121 (Fig. 1) enclosed within a motor housing 122 (Fig. 2) and a rotatable drive shaft 125 for transmitting rotary motion to an impeller assembly 130. Specification, page 8, lines 8-1 1. In other words, the fan in Appellants claimed system moves the exhaust gas. In contrast to this, the fan of the EU '480 device has no **motor**. Rather, it is the exhaust gas which moves the fan." Examiner respectfully disagrees. It is submitted that the axial fan of EU '480 moves the gas stream through the gas phase reactor as described in the above paragraph 1. It is noted that the features upon which applicant relies (i.e., **motor**) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). **(2)** Applicants argued (page 14, lines 6-9) "...nowhere does EU '480 teach a system for catalytically treating a gas stream which comprises gas flow modification means positioned between the impeller and the gas

phase reactor for decreasing gas stream velocity and increasing gas flow uniformity, as recited in (c) of Claim 1." Examiner respectfully disagrees. Applicants' attention is drawn to Applicants' specification on page 12, lines 6-20. The original specification discloses "*In order to achieve more even flow of flue gas the fan system section 200 for includes a gas flow modification velocity and decreasing the flue gas flattening the velocity profile of the gas. The gas flow modification section 200 includes a generally cylindrical, having a distally pointing tapered end portion 141 with generally conical shape. The tail cone 140 supported longitudinally extending tail cone 140 by longitudinally oriented planar struts 145 positioned the annular space between the tail cone 140 and the interior surface of the housing. The planar struts 145 not only help support the tail cone 140 but also act as baffles to reduce the gas flow swirl and redirect spinning component of the gas velocity towards axial flow of the flue qas throuqh the system.*" Examiner respectfully disagrees. The converging section 13 (Figure and page 5, lines 6-12) in conjunction with the flare portion 34 constitutes the gas flow modification means and the converging section 13 and the flare portion 34 inherently facilitates in decreasing gas stream velocity and increasing gas flow uniformity. It is noted that the flow modification means include generally the tail cone 140, planar struts 145, guide vane 310, and perforated walls 321 are not recited in claim 1. Note, the court explained that "reading a claim in light of specification, to thereby interpret limitations explicitly recited in the claim, is a quite different thing from 'reading limitations of the specification in to a claim,' to thereby narrow the scope of the claim by implicitly was advocating the latter, i.e. that impermisisible importation of subject matter from the specification into the claim. *See In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997).

(3) Applicants also argued that "The recycling system illustrated in Fig. 2 of Yamaguchi and described at col. 1, lines 35- 47, recycles NOx-free gas from downstream of the catalyst beds, adds ammonia in vaporizer 11 and cycles ammonia-containing gas via line 12 to a region upstream of the catalyst but downstream of the turbine 1. The cycling system described in Yamaguchi is not similar to that of Appellants', nor is it equivalent in operation or result." Examiner respectfully disagrees. Yamaguchi discloses a gas-recycling stream (via fan 10, Figure 2) downstream of a gas turbine 1 to facilitate vaporizing the ammonia and means for introducing reducing agent (via nozzle 10a) to the convection (4) facilitate in reducing the NOx (Col. 1, lines 50-55). With respect to the recycling portion of the flue gas to the convection section of the furnace located upstream of the axial fan, it would have been obvious in view of Yamaguchi to one having ordinary skill in the art to recycle a portion of the flue gas upstream of the gas turbine to effectively pressurized and deliver the gas back into the catalytic system for gas treatment and such configuration provides a cost savings by eliminating the need for additional exhaust fan. It is submitted whether recycling a portion of the flue gas downstream of the axial fan to either upstream or downstream of the axial fan does not alter the mechanism of purifying the flue gas stream being the fact that the flue gas stream is mixed and vaporized the reducing agent NOx upstream of the catalyst member (6) [the flue gas stream (via fan 10) is mixed and vaporized the reducing agent (via line 8) prior to reaction taking place in the catalyst member 6 of Yamaguchi '355] as evidenced by Yamaguchi '355. Furthermore, the recitation with respect to recycling a portion of the flue gas upstream of the axial fan is directed to the manner of operating a

device, intended use, and rearrangement of parts. See *In re Otto*, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963) and See *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) and *In re Japiske,* 181 F.2d 1019, 86 USPQ 70 (CCPA 1950).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom P. Duong whose telephone number is (571) 272-2794. The examiner can normally be reached on 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Tom Duong
March 29, 2006

TD

Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700